Electronic Version
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Claims

[c1] An apparatus for controlling the injection of fuel in a turbine engine having a combustion chamber, said apparatus comprising:
at least four fuel injectors arranged in independent groups for delivering fuel in pulses to said combustion chamber of said turbine engine;
at least one operating sensor, said sensor having means for receiving sensor signals from a selected operating function of said turbine engine;
a programmable electronic control unit for receiving and comparing the value of said sensor signals from said turbine engine to the value of a desired signal, and for generating fuel injector control signals to said groups of injectors in response thereto; and
a means for directing said fuel injector control signals to said fuel injector groups to modify the pulse duration and/or frequency of said fuel injector groups in response to a deviation from desired engine speeds caused by variable operating loads encountered by said turbine engine.

[c2] The apparatus of claim 1 wherein said fuel injector

groups each atomizes the fuel supplied to individual injectors within said group and delivers said fuel in pulses from each injector within said group as a fine mist directly into said combustion chamber at the point of utilization.

[c3] The apparatus of claim 1 wherein said turbine engine comprises at least four fuel injectors with the quantity of fuel injectors being capable of being divided into groups with an equal number of said fuel injectors in each group.

[c4] The apparatus of claim 1 wherein at least one said operating sensor receiving input from a selected operating function of said turbine engine is utilized to control the pulse width and/or frequency of said groups of fuel injectors.

[c5] The apparatus of claim 1 in which the programmable electronic control unit consists of a group comprising a microprocessor and a microcomputer to control said injector groups.

[c6] The apparatus of claim 1 in which the orientation of said injectors penetrating said combustion zone of said turbine is parallel to the axis of said turbine engine's shaft or displaced at some angle from the axis of said turbine

shaft.

[c7] A method for controlling the injection of fuel in pulses by groups of injectors in a turbine engine having a combustion chamber and having at least four fuel injectors arranged in groups and at least one sensor for sensing operating signals from said engine, said method comprising the steps of:
delivering fuel in pulses to said combustion chamber using said groups of fuel injectors;
sensing at least one operating sensor signal from said turbine engine using said sensor; and
directing said fuel injector signals to said groups of fuel injectors to modify the pulse duration and/or frequency of fuel injection in response to a deviation from desired engine operating parameters caused by variable operating loads encountered by said turbine engine.

[c8] The method of claim 7 wherein said operating sensor signal is generated from a selected parameter of said turbine engine.

[c9] The method of claim 7 wherein said step of generating control signals to groups of injectors by said programmable electronic control unit is accomplished using a pulse width modulation system comprising at least one of a microprocessor and a microcomputer.

[c10] The method of claim 7 wherein said turbine engine comprises at least two groups of fuel injectors utilizing at least two injectors in each group.

[c11] The method of claim 7 wherein said turbine engine utilizes an equal number of injectors in each group equally distributed radially around the combustion area of said turbine.

[c12] The method of claim 7 wherein said injectors are arranged to penetrate the combustion zone of said turbine engine either parallel to the axis of the shaft of said turbine engine or displaced at some angle from the axis of said turbine shaft.